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L1	1	("6108497").PN.	USPAT; USOCR	OR	OFF	2005/11/17 14:04
S1	177	(703/9).CCLS.	USPAT; USOCR	OR	OFF	2005/11/17 08:33
S2	12	("20020082815"   "4683759"   "5226092"   "5313559"   "5550761"   "5741980"   "5960187"   "6028992"   "6505579"   "6654697"   "6758102"   "6823296").PN. OR ("6941254").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/11/17 08:17
S3	28	S1 and transformation	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:15
S4	0	simulat\$5 same trnasformation same fluid\$2	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:16
S5	51	simulat\$5 same transformation same fluid\$2	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:16
S6	7	simulat\$5 same transformation same fluid\$2 same matrix	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:17
S7	57717	fluid and simulat\$5	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:17
S8	6047	fluid and simulat\$5 and transformation\$2	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:17
S9	238	fluid and simulat\$5 and transformation\$2 adj matrix	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:18
S10	0	fluid and simulat\$5 and transformation\$2 adj matrix and pengrobinson	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:19
S11	2	fluid and simulat\$5 and transformation\$2 adj matrix and peng-Robinson	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/11/17 09:23

S12	6	((("4187548") or ("5774381") or ("5826065") or ("6094619") or ("6212488") or ("6336085")).PN.	USPAT; USOCR	OR	OFF	2005/11/17 09:25
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6136683, A1999-04-9240-006, C1999-02-7340-062; 19990101.

**Title**
Numerical **simulation** of ground water mounding and its verification by Hele-Shaw model.
**Author(s)**
[Tswn-Syau-Tsay](#); [Hoopes-J-A](#).
**Author affiliation**

Agricultural Eng Res Center, Chung-Li, Taiwan.

**Source**

Computers-Geosciences (UK), vol.24, no.10, p.979-90, Dec. 1998. , Published: Elsevier.

**CODEN**

CGEODT.

**ISSN**

ISSN: 0098-3004, CCCC: 0098-3004/98/ (\$19.00).

**Availability**

SICI: 0098-3004(199812)24:10L:979:NSGW; 1-2

Electronic Journal Document Number: S0098-3004(98)00060-0.

**Publication year**

1998.

**Language**

EN.

**Publication type**

J Journal Paper.

**Treatment codes**

T Theoretical or Mathematical.

**Abstract**

Ground water mounding is the rise of the water table above its regional level in a local area of an aquifer in order to provide sufficient head to distribute the water supplied by a localized source to that area. The shape and height of the mound depend on many factors including recharge rate and distribution, geology, hydraulic conductivity, flow/head control locations, saturated thickness and regional flow in the aquifer in that area. In this work, an accurate and efficient numerical model for calculating ground water mounding was developed. Numerical calculations were done on a uniform rectangular grid, obtained by a **transformation** of the physical domain. Grid for computation were generated by a grid generation code, Eagle View, which is developed by the Mississippi State

University. Model predictions were verified with tests in a Hele-Shaw model for situations with and without a regional flow, with and without heterogeneity, and for two recharge rates. SAE#50 oil was used as the fluid in the Hele-Shaw. A peristaltic pump was used to supply the constant (and adjustable) recharge rate from the **reservoir** below the Hele-Shaw model. The results of experiments of estimating mounds and the numerical mounding model are in good agreement. However, mound height of the region below recharge of Hele-Shaw model can not be observed because the how of this region combines vertical flow from recharge and the rising of the free surface (horizontal flow). Hence, an emulated perched aquifer was used so that mound height of the recharge region can be observed. (19 refs).

**Descriptors**

geophysics-computing; groundwater; numerical-analysis.

**Keywords**

ground water mounding; Hele Shaw model; water table; aquifer; recharge rate; hydraulic conductivity; EagleView; peristaltic pump; emulated perched aquifer.

**Classification codes**

A9240K (Groundwater).  
A0260 (Numerical approximation and analysis).  
C7340 (Geophysics computing).

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